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Pesticide Fact Sheet No. 201: Methomyl

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This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

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EPA

Pesticide Fact Sheet

Name of Chemical: METHOMYL

Reason for Issuance: ISSUANCE OF REGISTRATION STANDARD

Date Issued: April 1989

Fact Sheet Number: 201

1. Description of Chemical

-Generic Name: S-methyl N-[(methylcarbamoyl)oxy]-thioacetimidate

-Common Name: Methomyl

-Trade Name and other names: methyl N-[[(methylamino)carbonyl]oxy]-ethanimidothioate, methyl N-[(methylcarbamoyl)oxy]-thioacetimidate, Lannate, Lanox, and Nudrin

-EPA Shaughnessy Number: 090301

-Chemical Abstracts Service (CAS) Number: 16752-77-5

-Year of Initial Registration : 1968

-Pesticide Type: Insecticide

-Chemical Family: Carbamate

-U.S. Producer: E.I. duPont de Nemours and Company

2. Use Patterns and Formulations

-Application sites: Terrestrial food and non-food crops, Greenhouse food and non-food crops, Aquatic food crops, Forestry (ground only), and Indoor- human and animal premise

-Types and method of applications: Foliar and broadcast soil application by both ground and aircraft equipment

-Application rates: 0.1 to 1.5 lb a.i. per acre

-Types of formulations: Wettable powders, emulsifiable and soluble concentrates, granulars, baits, and dusts

-Usual carriers: Petroleum and clay carriers

3. Science Findings

Physicochemical Characteristics:

Technical methomyl is a white crystalline solid with a melting point of 78-79 C. Methomyl is soluble in water and most organic solvents. Methomyl's empirical formula is C5H10N202S and its molecular weight is 162.2.

Toxicological Characteristics:

-Acute Oral: 17 to 24 mg/kg (rat) Toxicity Category I
-Acute Dermal: >5000 mg/kg (rabbit) Toxicity Category III
-Primary Eye Irritation: Data gap
-Acute Inhalation: 0.30 mg/liter/4 hours Toxicity Category III
-Primary Skin Irritation: Data gap
-Dermal Sensitization: Data gap
-Acute Delayed Neurotoxicity: Data shows no potential for this effect.
-Subchronic dermal (21 day): Data gap
-Oncogenicity: A rat chronic/oncogenicity study showed no oncogenic effects at the highest dose tested (HDT-400 ppm). A mouse oncogenicity study showed no oncogenic effects at HDT 200 ppm.
-Metabolism: Data Gap- Preliminary data suggests that methomyl may be metabolized to the possible human oncogen acetamide. Additional metabolism data in the rat and monkey are required to detect the possible presence of acetamide in the tissues.
-Teratology: Not teratogenic or embryotoxic at HDT 400 ppm in rats. Not teratogenic or embryotoxic at HDT in rabbits (Maternal No Observed Effect Level [NOEL] of 2 mg/kg/day).
-Reproduction: No observed effects with a NOEL of 100 ppm.
-Mutagenicity: Not a mutagen in all the required tests.

Physiological and Biochemical Characteristics:

-Mechanism of Pesticide Action: Methomyl kills by poisoning the insects' nervous system.
-Metabolism and perisistence in plants and animals:
Plants: Available data demonstrate that methomyl is rela-

tively persistent on leaf surfaces and fruit. There has been some concern in the recent past that acetamide, a suspected human carcinogen, may occur in plants following treatment with methomyl. However, recently available data on thiodicarb, a related insecticide that breaks down initially to methomyl in plants, reveal that acetamide will not occur in plants treated with methomyl. Furthermore, any acetamide formed from acetronitrile, a known metabolite of methomyl, will be hydrolyzed to form acetic acid and ammonium ion.

Animals: The available data are not adequate to assess the nature of methomyl in animals. Additional metabolism data (ruminants and poultry) are required to detect the possible presence of acetonitrile and acetamide. These data were requested in a FIFRA 3(c)(2)(B) letter dated March 23, 1987.

Environmental Characteristics:

-Available data are insufficient to fully assess the environmental fate of methomyl. The Registration Standard issued in 1981 did not address the aquatic uses of methomyl. Data must now be submitted for the following: aquatic aerobic, aquatic anaerobic, aquatic field dissipation and irrigated crops. Vapor pressure data indicate the need for volatility data. Monitoring data are needed to assess the potential of this pesticide to contaminate groundwater.

Ecological Characteristics:

-Acute avian oral toxicity: LD50 24.2 mg/kg for bobwhite quail (highly toxic).
-Avian dietary toxicity: LC50 of 1100, 1975, and 2883 ppm respectively for bobwhite quail, ring-necked pheasant, and mallard duck (slightly toxic).
-Freshwater fish acute toxicity: LC50 = 1.6 ppm for Rainbow trout. LC50 = 0.5 ppm for channel catfish (moderate to highly toxic for fish).
Freshwater aquatic invertebrate toxicity: LC50 values of 0.0698 to 0.343 ppm suggest that is very highly toxic to freshwater invertebrates.

Major Routes of Exposure:

-Dermal followed by inhalation. Human exposure occurs from mixing, loading and application. Exposure can be reduced by the use of goggles or face shield and protective clothing.

Tolerance Assessment:

-Tolerances have been established for residues of methomyl in a variety of raw agricultural commodities (Refer to 40 CFR 180.253 for listing of tolerances). Methomyl's tolerances

have been reassessed using the Tolerance Assessment System (TAS). The Acceptable Daily Intake (ADI) for this chemical is 0.025 mg/kg/day. The Theoretical Maximum Residue Contribution (TMRC) for the U.S. population is 0.016188 mg/kg/day, which occupies 65% of the ADI.

4. Summary of Regulatory Position

This review of methomyl is the second intensive evaluation of the compound. In its original Standard, issued in 1981, the Agency summarized the available data supporting the registration of methomyl and concluded that additional data were needed data to fully evaluate the pesticide.

The Agency has since received and reviewed the data and has revised its scientific and regulatory conclusions in relative to these data. Additionally, other information on the chemical (for example the acetimide issue) and the expanded data requirements promulgated in 1984 at 40 CFR Part 158, have added new data requirements. This Standard, which supercedes the 1981 document, is the Agency's updated assessment of the pesticide and the data needed to support its continued registration.

A. Methomyl is not being placed in Special Review at this time because none of the criteria for initiation of Special Review listed in 40 CFR 154.7 have been met. The Agency believes that the water soluble bag use restriction and the increased reentry intervals provide mixer/loader and field-worker protection. The Agency intends, however, to monitor State pesticide incidents monitoring systems to determine the effectiveness of labeling changes identified in the Standard. The Agency may impose further regulatory actions if these incidents reports indicate that these labeling changes are inadequate.

B. The Agency is requiring the submission of acute aquatic toxicity data and aquatic and non-aquatic field monitoring data on the end-use formulations and aquatic life stage data and avian reproduction data on the technical formulation in order to complete the wildlife risk assessment.

C. Based on methomyl's use pattern and toxicity data, the Agency has determined that methomyl may trigger the endangered species criteria for fish, aquatic organisms and insects. No endangered species labeling is required at this time. A program is being developed by the Agency to reduce or eliminate exposure of this chemical to these species. After this program is developed, the Agency will notify registrants of any additional labeling that may be required to remain in compliance with FIFRA. The labeling requirements affecting

methomyl, e.g. those listed in PR Notices 87-4 and 87-5, have been withdrawn pending reissuance.

D. Various methomyl formulations were classified as restricted use products by regulation in 1978 (see 40 CFR 162.13). The Agency has now determined that the 90% water soluble bag formulation should also be classified as a restricted use pesticide. Labeling language for each of the restricted use products must specify that the restriction is based on high acute toxicity to humans.

E. The following reentry intervals are being imposed at this time based on the submitted reentry data: one day for beans, cabbages, roses grown outdoors and carnations, whether grown outdoors or in a greenhouse; three days for cotton, nectarines, and oranges/citrus; four days for peaches; and seven days for grapes. Because of the similarity in crops and in the work tasks performed in those crops, a three day reentry interval is being established for apples, and a one day reentry interval for alfalfa, asparagus, broccoli, brussel sprouts, carrots, cauliflower, celery, collards, cucumbers, lettuce, melons, onions, peanuts, peas, peppers, potatoes, sorghum, soybeans, summer squash, spinach, sugar beets, tobacco, and tomatoes. Additional data are being requested to set reentry intervals for mint, corn, roses grown in greenhouses, and chrysanthemums grown in greenhouses or outdoors. Until these data are received and evaluated, an interim seven day reentry interval is being established for corn, and a one day reentry interval is being established for these crops and all other crops and sites not specifically listed above.

F. The following labeling is required for all manufacturing use products:

This pesticide is toxic to fish. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public waters unless this product is specifically indentified and addressed in the NPDES permit. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

G. The following labeling is required for all end use products:

PERSONAL PROTECTIVE EQUIPMENT:

USE ONLY WHEN WEARING THE FOLLOWING PERSONAL PROTECTIVE EQUIPMENT DURING MIXING/LOADING, APPLICATION, REPAIRING AND CLEANING OF MIXING, LOADING, AND APPLICATION EQUIPMENT, AND

DISPOSAL OF THE PESTICIDE: longsleeve shirt; long-legged pants; shoes and socks, chemical resistant gloves; face shield or goggles; NIOSH or MSHA approved respirator. During equipment repair and cleaning, the respirator need not be worn.

IF APPLICATION IS PERFORMED USING AN ENCLOSED CAB OR COCKPIT, THE FOLLOWING PROTECTIVE CLOTHING AND EQUIPMENT MAY BE WORN AS AN ALTERNATIVE: long-sleeve shirt and long-legged pants; shoes and socks. All other protective clothing and equipment required for use during application must be available in the cab and must be worn when exiting the cab into treated area. When used for this purpose, contaminated clothing may not be brought back into the cab unless in an enclosure such as a plastic bag.

IMPORTANT! If pesticide comes in contact with skin, wash off with soap and water and contact a physician immediately. ALWAYS WASH HANDS, FACE, AND ARMS WITH SOAP AND WATER BEFORE USING TOBACCO PRODUCTS, EATING, DRINKING, OR TOILETING.

AFTER WORK: Before removing gloves, wash them with soap and water. Take off all work clothes and shoes. Shower using soap and water. Wear only clean clothes when leaving job--do not wear contaminated clothing. Personal clothing worn during work must be stored and laundered separately from protective clothing and household articles. Store protective clothing separately from personal clothing. Clean or launder protective clothing after each use. Respirators must be cleaned and filters replaced according to instructions included with the respirators. Protective clothing and protective equipment heavily contaminated or drenched with methomyl must be destroyed according to state and local regulations. HEAVILY CONTAMINATED OR DRENCHED CLOTHING CANNOT BE ADEQUATELY DECONTAMINATED.

DURING AERIAL APPLICATION, HUMAN FLAGGERS ARE PROHIBITED.

PROTECTIVE CLOTHING LABEL STATEMENTS FOR 1% BAITS

Use only when wearing the following personal protective equipment during loading, application, repairing and cleaning of mixing, loading, and application equipment, and disposal of the pesticide: longsleeve shirt; long-legged pants; shoes and socks; gloves.

IMPORTANT! If pesticide comes in contact with skin, wash off with soap and water.

ALWAYS WASH HANDS, FACE, AND ARMS WITH SOAP AND WATER BEFORE USING TOBACCO PRODUCTS, EATING, DRINKING, OR TOILETING.

OTHER LABEL STATEMENTS FOR BAITS

Do not contaminate feed and foodstuffs. Do not apply where poultry or other animals, especially dogs and young calves, can pick it up or lick it.

Do not use in edible product areas of food processing plants, restaurants, or other areas where food is commercially prepared or processed. Do not use in serving areas while food is exposed.

REENTRY INTERVALS:

The following reentry intervals are required in the directions for use section of all labels with terrestrial and greenhouse food and non-food uses: three days for cotton, nectarines, citrus and apples; four days for peaches; seven days for grapes and corn; all other crops, one day.

The following fish and wildlife statements are required to appear under the "Environmental Hazards" heading:

1. Granulars (including baits): This pesticide is toxic to birds. Collect, cover or incorporate granules spilled on the soil surface. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water when disposing of equipment washwaters.

2. Non-Granular:

a. Aquatic (Watercress): This pesticide is toxic to fish. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwaters.

b. Terrestrial: This pesticide is toxic to fish and wildlife. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwaters.

H. End use products (except granulars and baits) with outdoor crop uses must have the following bee caution: This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area.

Products with lentil use must include a pregrazing interval of three days and a preharvest interval of seven days.

I. Pursuant to the data requirements in 40 CFR Part 158,

the Agency has determined that the following data are essential to the Agency's assessment and should receive a priority review when they are received by the Agency:

40 CFR 158.240 Residue Chemistry

171-4 Nature of the Residue (Metabolism-Livestock), Meat/Milk/Poultry and Eggs

40 CFR 158.390 Reentry Protection

132-1 Foliar Dissipation (Reentry)
201-1 Droplet Size Spectrum
201-1 Drift Field Evaluation

40 CFR 158.340 Toxicology

85-1 General Metabolism (Rat and Monkey)
82-2 Subchronic Dermal (21-Day)

40 CFR 158.290 Environmental Fate

162-3 Anaerobic Aquatic Metabolism
162-4 Aerobic Aquatic Metabolism
162-2 Laboratory Volatility
164-2 Aquatic (Sediment)
165-5 Accumulation in Non-Target Organisms
- Groundwater Monitoring

40 CFR 158.490 Ecological Effects

71-4 Avian Reproduction
71-5 Simulated and Actual Field Testing- Birds
72-1 Freshwater Fish Acute Toxicity
72-2 Acute Toxicity- Freshwater Invertebrate
72-3 Acute Toxicity- Aquatic Estuarine and Marine Organism
72-5 Fish Life-Cycle
72-7 Field Testing for Aquatic Organism

5. Summary of Major Data Gaps

-The following studies are required to assess the toxicological characteristics of technical methomyl: Eye irritation, dermal sensitization, 21-day dermal toxicity, and general metabolism testing (rat and monkey).
-The following data are required to fully characterize methomyl's environmental fate: Reentry, volatility (lab), aquatic sediment dissipation, accumulation studies in irrigated crops and in fish, and groundwater monitoring.
-Additional residue and processing studies in certain commodities, are required to support existing tolerances.
-The following data are required to complete a wildlife risk

assessment: Avian subacute dietary toxicity, avian reproduction, freshwater fish toxicity, acute toxicity to freshwater invertebrates, acute toxicity to estuarine and marine organisms, fish early life stage and aquatic invertebrate life cycle, and simulated or actual field testing for aquatic organisms and mammals and birds.

-Product chemistry and acute toxicity data are required.

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Disclaimer: The information in this Fact Sheet is a summary only and is not to be used to satisfy data requirements for pesticide registration and reregistration. The complete Registration Standard for methomyl may be obtained from the Information Services Section, Program Management and Support Division (TS-757C), EPA, 401 M St., SW, Washington, D.C. 20460.